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The Impact of PPS on Medicare SNF Casemix

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I. INTRODUCTION

This paper addresses the issue of access to nursing home care by examining changes in casemix patterns in skilled nursing facilities (SNFs) between 1983 and 1985. This period is of interest because it provides data points prior to and after the implementation of Medicare's hospital prospective payment system (PPS).

Medicare Benefits Coverage And PPS

The Medicare skilled nursing facility benefit covers short-term, post-acute care for persons requiring skilled nursing services or rehabilitative services in an inpatient setting. Coverage is limited to patients who have had a hospital stay of at least three days. The maximum covered SNF stay is 100 days, however, in reality, the average covered stay was 29 days in 1983. Thus, the Medicare SNF benefit is very different from the long term care benefit provided by Medicaid.

The SNF benefit was basically designed as a less costly alternative to the final days of hospital care. Prior to the implementation of the Medicare hospital PPS, hospitals were paid on the basis of per diem reasonable cost. Thus there were no inherent incentives to limit lengths of stay. With the implementation of PPS (phased in beginning in October 1983), the unit of payment was changed from a per diem to a per discharge basis. Admitting diagnoses were classified into one of 475 diagnosis related groups or DRGs, with payment tied to the average charge per stay, (and hence the average length of stay) for a given DRG. Thus, under PPS, hospitals have a strong incentive to discharge patients sooner. It should come as no surprise that hospitals have indeed responded to those incentives. Hospital lengths of stay had been

declining even prior to the implementation of PPS, however the rate of decline has been much greater since its implementation. As shown in Table 1, among Medicare admissions, the average length of stay declined by 16 percent between fiscal year 1983 and 1985, from 10 days to 8.4 days.

In addition, Farley has shown that the average casemix of Medicare hospital patients increased during the 1983-1985 time period. He estimates that the expected length of stay (casemix) for Medicare beneficiaries increased by 6.3% between 1983 and 1985, from 9.69 days to 10.30 days in 1985. Thus the observed decline in average length of stay is even more dramatic after adjusting for casemix.[1] The observed increase in hospital casemix is linked to declining hospital admission rates. As technology improves, the number of ambulatory care providers increases, and reimbursement systems create incentives, increasingly greater numbers of procedures are being performed on an outpatient rather than an inpatient basis. This means that the patients being admitted to hospitals are sicker on average than previous inpatient populations. When this is coupled with declining inpatient lengths of stay the issue of access to SNF care becomes more obvious.

The Nursing Home Market and Access to SNF Care

The question then arises as to whether or not a sicker mix of Medicare patients are requiring post-hospital care and do they have access to the SNF care that was designed to substitute for the tail-end of hospital stays? Access to SNF care is a particular concern for Medicare patients because the nursing home market is dominated by Medicaid and private pay patients. In 1983, Medicare accounted for slightly less than two percent of all nursing home

1. Dean E. Farley, "Trends in Hospital Average Lengths of Stay, Casemix, and Discharge Rates, 1980-1985," Hospital Studies Research Program Note 11, National Center for Health Services Research, April 1988, pp. 8-9.

Table 1

Average Length of Stay for Medicare Beneficiaries in Short-Run Hospitals, 1967-85

Year	Average Length of Stay	Percent Change
CY 1967	13.8	—
CY 1968	13.8	0.0
CY 1969	13.5	-2.2
CY 1970	13.0	-3.8
CY 1971	12.5	-3.9
CY 1972	12.1	-3.2
CY 1973	11.7	-3.3
CY 1974	11.5	-1.7
CY 1975	11.2	-2.6
CY 1976	11.1	-0.9
CY 1977	10.9	-1.8
CY 1978	10.8	-0.9
CY 1979	10.7	-0.9
CY 1980	10.6	-0.9
CY 1981	10.5	-0.9
FY 1981	10.5	—
FY 1982	10.3	-1.9
FY 1983	10.0	-2.9
FY 1984	9.1	-9.0
FY 1985	8.4*	-7.7

Source: Health Care Financing Administration, Bureau of Data Management and Strategy.

* Based on records processed at HCFA through December 1985.

expenditures, while Medicaid accounted for slightly less than 50 percent. The market domination by Medicaid and intermediate care (as opposed to SNF care), the limited supply of Medicare SNF beds, and variations in the interpretations of Medicare coverage rules by intermediaries, makes access to care a major concern for Medicare beneficiaries.[2]

Nursing homes can be certified in whole or in part to participate in Medicare, Medicaid, or both programs. Under Medicaid, homes can also be certified at two levels, either as a skilled nursing facility (SNF) or as an intermediate care facility (ICF). Medicare certifies only SNFs. Table 2 presents the number of Medicare certified beds per 1,000 elderly by state in 1985. The tremendous variation in the supply of beds across states is readily apparent from that table. The supply of beds per thousand elderly ranged from less than one in Oklahoma, where roughly 2 percent of all long-term care facilities are certified by Medicare, to 47 in North Dakota and 46 in Connecticut, with respectively 70 and 77 percent of all facilities certified by Medicare. There is also evidence to suggest that the limited supply of Medicare certified SNF beds is becoming even more constrained. Sangl has reported that despite increases in the number of Medicare certified facilities, the number of Medicare certified beds decreased by almost 16 percent between 1984 and 1986.[3] In addition, to compound the decline in available certified beds, certification is not synonomous with participation. While approximately two-thirds of all SNFs are certified by Medicare, the vast majority of Medicare certified

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2. See for example, Smits, Feder, and Scanlon, "Medicare's Nursing Home Benefit: Variations in Interpretation," New England Journal of Medicine 307 (September 30, 1982):855-862.

3. Margaret Jean Hall and Judith Sangl, "Impact of Medicare's Prospective Payment System (PPS) on Long Term Care Providers," Presented at the American Public Health Association Annual Meeting, New Orleans, October 20, 1987. Table 3.

Table 2

Medicare Beds per 1,000 Elderly,
by State, 1985

Alabama	25.87	Montana	21.88
Alaska	8.71	Nebraska	5.64
Arizona	3.58	Nevada	23.78
Arkansas	2.56	New Hampshire	4.44
California	31.29	New Jersey	15.06
Colorado	14.63	New Mexico	2.85
Connecticut	46.81	New York	33.21
Delaware	20.07	North Carolina	13.54
District of Columbia	9.91	North Dakota	47.23
Florida	11.31	Ohio	31.68
Georgia	15.28	Oklahoma	0.51
Hawaii	18.36	Oregon	4.16
Idaho	27.91	Pennsylvania	19.52
Illinois	8.76	Rhode Island	13.94
Indiana	14.59	South Carolina	23.53
Iowa	2.09	South Dakota	5.28
Kansas	4.24	Tennessee	7.25
Kentucky	8.64	Texas	2.23
Louisiana	5.44	Utah	14.18
Maine	2.43	Vermont	9.33
Maryland	24.64	Virginia	3.91
Massachusetts	8.40	Washington	6.45
Michigan	26.98	West Virginia	13.73
Minnesota	19.27	Wisconsin	14.05
Mississippi	1.04	Wyoming	9.98
Missouri	11.44		

Source: Urban Institute estimates from the 1985 MMACS file.

SNFs provide very few Medicare days. In 1983, less than 400 SNFs provided 40 percent of total Medicare SNF days.[4]

Given the limited role of Medicare as a payer for the nursing home industry, Medicare patients' access to SNF care thus depends to a large extent, upon the characteristics of the industry created in each state by Medicaid. If the Medicaid program in a given state has resulted in an industry in which a large percentage of the beds are certified as SNFs, or in which nursing homes are staffed to provide a broad range of rehabilitative therapies, then the homes in that state will be more likely to respond to the demand for care by Medicare patients. If, however, the nursing home industry's costs have been constrained by the Medicaid program, or if the area has a high proportion of ICF beds, or if staffing levels are only barely adequate to meet certification requirements, then the industry will be less able to respond to the demand for care by Medicare patients.[5]

The implementation of the hospital PPS thus has the potential to exacerbate an already critical condition—namely poor access to post-acute care for Medicare patients. Given that hospitals are discharging patients sooner, and the hospital casemix of Medicare patients appears to be increasing, we can assume that the demand for SNF care by sicker patients is rising.[6] The issue of access to SNF care is thus of even greater concern.

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4. Health Care Financing Administration, U.S. Department of Health and Human Services, "Report to Congress: Study of the Skilled Nursing Facility Benefit Under Medicare," January 1985, p. 4.

5. John Holahan and Lisa Dubay, "The Effects of the Nursing Home Bed Supply on Hospital Discharge Delays," Urban Institute Working Paper 3710-01-01, December 1987, pp. 6-7.

6. Fitzgerald, et al. found in their study of elderly patients hospitalized for hip fractures in Indiana, that since the implementation of PPS, those patients received shorter, less care-intensive hospitalizations and were more likely to be institutionalized. They were also more likely to be

(Footnote 6 Continued on Next Page

A recent GAO survey of hospital discharge planners found that 97 percent of the sampled planners (sample of 985 Medicare certified hospitals) reported that they had difficulty placing Medicare patients in nursing homes, and 56 percent stated that obtaining access to SNF care was even more difficult in 1985 than in 1982. Holahan, et al., also found evidence that inability to place Medicare patients in nursing home beds caused hospital discharge delays. They found that several factors contributed to discharge delays, including nursing home bed shortages, low proportions of certified beds in an area, and stringent Medicaid reimbursement systems.[7]

This paper will focus on one aspect of the issue of access to SNF care, namely whether nursing homes are treating a different mix of patients in the post-PPS period than in the pre-PPS period. The primary motivating concern is that as the demand by sicker patients for SNF care increases and the supply of SNF beds remains limited, SNFs may either indulge in "cream-skimming" or may deny access to the sickest Medicare patients simply because their existing levels of staffing and medical services are insufficient to adequately provide care to this sicker patient population. "Cream-skimming" in this context implies that facilities fill their Medicare beds with less costly, less resource-intensive (less sick) patients, making it even more difficult for relatively sicker patients to receive SNF care.

(Footnote 6 Continued from Previous Page)
receiving care at six months after hospital discharge. See: Fitzgerald, et al., "Changing Patterns of Hip Fracture Care Before and After Implementation of the Prospective Payment System," JAMA, July 10, 1987, Vol. 258, No. 2, pp. 218-221.

7. General Accounting Office, "Posthospital Care: Discharge Planners Report Increasing Difficulty in Placing Medicare Patients," January 1987; and John Holahan, Dubay, Kenney, Welch, Bishop, Dor, and Laudicina, "Should Medicare Compensate Hospitals for Administratively Necessary Days?" Urban Institute Working Paper 3710-01-05, May 1988.

Representatives of the nursing home industry contend that "cream-skimming" is actually a reflection of the higher cost of care required by Medicare patients. Medicare reimburses nursing homes on the basis of average facility costs for all types of patients. Medicare patients are typically more resource intensive, and thus are higher cost patients.[8] In fact, Dor has shown that the marginal cost of treating a Medicare patient is more than double the average facility cost in SNF-only facilities, and is more than triple the average facility cost in multilevel facilities.[9] Thus, nursing homes may "cream-skim" from the pool of Medicare patients to select patients whose marginal cost may be closer to average cost.

II. DATA DESCRIPTION AND METHODOLOGY

The data used to analyze this issue are all Medicare bills for SNF care from fiscal years 1983 and 1985. These are the bills submitted to HCFA by the skilled nursing facilities. They identify the provider, the patient, the length of stay, covered days, the charges--both in total and separately for accommodations and therapies--Medicare's payment amount, and the patient's SNF admitting diagnosis. For both 1983 and 1985, these SNF admitting diagnoses were aggregated into the same 475 DRG categories used in the hospital PPS.

The information from the bills was used to develop a casemix index for 1983 and 1985 to examine whether nursing homes have changed the mix of patients they are treating. The weights are held constant between 1983 and 1985 so that

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8. P.W. Shaughnessy, et al., "Nursing Home Case-Mix Differences Between Medicare and Non-Medicare and Between Hospital-Based and Freestanding Patients." Inquiry 22 (Summer 1985):162-177.

9. Avi Dor, "The Costs of Medicare Patients in Nursing Homes," Urban Institute Working Paper 3586-04, forthcoming June 1988.

any changes in the casemix index between the two years would reflect changes in the mix of patients served. If SNFs are treating a more resource intensive mix of patients in the post-PPS period, then the casemix index would be higher in 1985 than in 1983. If SNFs are engaging in cream-skimming, or otherwise restricting the access of the sicker Medicare patients, then the casemix index would decline, or possibly even remain constant.

The casemix index constructed for this analysis will measure changes in the relative mix of diagnoses treated by skilled nursing facilities. If SNFs change the mix of diagnoses treated, such that they admit greater proportions of patients from more resource intensive DRGs, their casemix index will increase commensurately. The index will thus focus on one aspect of casemix change, namely that which occurs as a result of changing the mix of DRGs. It will not capture changes which occur within DRG categories because it cannot measure changes in the severity of illness within DRGs. As a result, this index will tend to understate changes in casemix if patients within a given DRG category are, on average, more severely ill in 1985 than in 1983, and may possibly overstate casemix increases if the reverse scenario is true. Given the declining hospital length of stay among Medicare patients in the 1983-1985 time period, and based upon other external evidence[10] it is highly likely that the casemix index constructed here will understate the actual change in casemix.

In addition to the data base providing convenient pre- and post-PPS data points, the existence of the four PPS-waiver states (Maryland, Massachusetts, New York and New Jersey) provides us with a natural experiment to test the

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10. For example, Feder, Scanlon and Hoffman found from their survey of nursing homes that SNF patients in 1985 typically had more severe medical problems than the average patient in 1982.

impact of PPS on nursing home casemix changes. Hospitals in these four states were exempted from Medicare's prospective payment system during the period of analysis.

Construction of a Casemix Index

The development of the SNF casemix index involved two basic tasks: First the construction of a weight for each DRG to measure the expected resource intensity of cases in each DRG relative to the average case; and second, use of those weights in the computation of a facility-specific casemix index for a matched set of homes. This methodology was used in a cross-sectional analysis of 1980 data by Phil Cotterill at HCFA to explore the applicability of a DRG-based payment system for SNF care.[11]

Several steps were involved in the construction of the DRG relative weights. First, the 1983 bill file was matched to the 1983 SNF cost report file by provider ID to obtain wage index data. The wage index is a variable used by HCFA to standardize costs across geographic areas so that inter-area cost comparisons can be made. Next, the 1983 bill records with the appended wage data were matched to the 1985 bill records by provider ID, so that the analysis includes only those bills submitted by a matched sample of 3148 providers. Any bill with a covered stay of less than one day or more than 100 days was excluded.

Relative weights were constructed based on total covered charges per day. Charges were used as a proxy measure of resource intensity. Charge data were used instead of cost data because cost data are not available on a patient specific basis. However Cotterill has shown that charge weights correspond

11. Phillip G. Cotterill, "Testing a Diagnosis-Related Group Index for Skilled Nursing Facilities," Health Care Financing Review, Summer 1986, Vol. 7, no. 4, pp75-85.

very closely to cost weights, and in fact charges form the basis of the PPS weights.[12]

All charges were standardized by the geographic wage index and extreme outlier values which most likely represented coding errors were excluded. Relative weights were calculated by dividing the 1983 average charge for each specific DRG by the corresponding average charge for all days for all DRGs. Two hundred twenty-eight (228) DRGs were represented on the 1983 file.[13] It should be remembered that the 475 DRGs used in the hospital payment system include surgical DRGs. With only a few exceptions, the SNF DRGs are confined to the medical categories. The twenty most frequently represented DRGs and their relative weights are presented later in Table 3.

The final step in constructing the casemix indices is to multiply the weight for each specific DRG by the proportion of days a given facility provided in that DRG category, and then sum over all DRGs to derive a casemix index for all matched facilities. This same procedure was followed in both 1983 and 1985 for each of the matched 3148 providers.

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12. P. Cotterill, J. Bobula, and R. Connerton, "Comparison of Alternative Relative Weights for Diagnosis-Related Groups," Health Care Financing Review, Vol. 7, No. 3. Spring 1986.

13. An additional 25 DRGs appeared on the 1985 file that were not present on the 1983 file. Combined, these DRGs accounted for 832 total covered days of the total 3.8 million covered days in 1985. With only two exceptions--DRGs 67 and 71--the 24 codes were for surgery DRGs, and probably reflected misapplication of the DRG grouper program. However, they did represent claims with covered days and program payments. These 24 DRGs were therefore incorporated into the "ungroupable" category.

III. DESCRIPTIVE ANALYSIS

Changes in the Volume of Medicare SNF Days

Analysis of the bill files revealed that the number of Medicare covered SNF stays in our matched sample of 3,148 facilities declined by nearly 20 percent between 1983 and 1985, from 186,774 to 149,666. Covered days totalled 5.6 million in 1983, and 3.8 million in 1985, a decline of 32 percent. This decline is attributable to several factors.

The most important factor is declining hospital admission/discharge rates. Farley has estimated that the mean hospital discharge rate dropped by 4.9 percent between 1983 and 1985. During that same time period, he estimates that the percentage of total admissions accounted for by Medicare declined very slightly from 30.9 percent in 1983 to 30.6 percent in 1985. Medicare patients have thus been a fairly constant (or slightly declining) percentage of a decreasing number of hospital admissions.[14] Therefore, it is reasonable to assume an absolute decline in the number of Medicare patients demanding SNF care. In fact, based on data from the American Hospital Association's Annual Survey of Hospitals, Dubay estimates that the number of Medicare hospital admissions declined by 5.9 percent between 1983 and 1985.[15]

The second reason for an observed decline in Medicare covered SNF admissions/days is the previously noted trend toward a decline in Medicare certified beds. While the number of Medicare certified facilities has increased over time, the number of certified beds has decreased. Therefore,

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14. The mean discharge rate is defined as "the ratio of total discharges in a year to number of beds." Farley, op. cit., pp. 4, 6, 9.

15. Lisa Dubay, "Changes in Access to the Skilled Nursing Facility Benefit from 1983 to 1985," Urban Institute Working Paper 3586-03, April 1988, p. 14.

the total industry's capacity to admit Medicare patients has declined. This could have been somewhat offset by the shorter lengths of stay in SNFs, which means that there was the potential for more admissions per bed. However, admissions per bed also declined during the 1983-1985 period. It should also be recalled that certification does not insure participation, so that the impact of the decertification of beds is magnified by the low participation rate of large numbers of those beds.[16]

A third possible explanation for a decline in SNF covered days is an increase in the number of claims denied coverage by Medicare intermediaries, and a simultaneous decrease in the number of days covered per stay. Feder, Scanlon and Hoffman, in a survey of 1,400 nursing homes, found a highly significant decline in Medicare's share of patient days in certified SNFs between 1982 and 1985, from 4.5 percent to 3.8 percent respectively. They also stated that certified SNFs reported an increase in the proportion of claims denied by Medicare intermediaries from 11.5 percent to 14.9 percent. Almost two-thirds of their responding certified SNFs that reported more restrictive coverage, reported declines in both the probability of receiving coverage for any day, and in the number of covered days within a covered stay.[17] Dubay has argued that while the number of Medicare enrollees entering nursing homes has increased by 11.3 percent between 1983 and 1985, the number using the Medicare SNF benefit has declined. In other words, Medicare enrollees may be entering

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16. Feder, Scanlon and Hoffman relied upon a survey of 1,400 nursing homes to estimate that 30.3 percent of discharges in certified SNFs had a length of stay less than 30 days in 1985, compared with 25.2 percent in 1982.

17. Judith Feder, William Scanlon, and Jody Hoffman, "Spillovers from Medicare PPS: Preliminary Results from a Nursing Home Survey," Presentation at the American Public Health Association, New Orleans, October 20, 1987.

nursing homes in greater numbers, but they are doing so as private pay or Medicaid patients.[18]

The final potential factor contributing to an observed decline in the number of covered days/stays between 1983 and 1985 is lags in the submission of bills. This is a concern because Health Care Financing Administration staff report that SNFs generally have a longer lag in bill submission than do other types of providers. HCFA staff state that there are approximately 10,000 bills outstanding from the 1983 file, and 48,000 bills outstanding from the 1985 file. However, these estimates are deceptive in two regards. First, it is unknown how many stays are represented by the outstanding bills. The proportion of multiple bills for any given single stay represented in the outstanding bill numbers is unknown. Thus, the 10,000 bills in 1983 and 48,000 bills in 1985 may actually represent a much smaller number of SNF stays. Second, HCFA considers as outstanding any bill which has been submitted for payment and been returned to the fiscal intermediary as ineligible for coverage either because there is no record of the beneficiary's eligibility, or the claim number is not identifiable, or because there is no record of a prior hospital stay. It is thus unclear what proportion of these "outstanding" bills are truly outstanding. Some portion of the bills would not be submitted again because the intermediary would determine that they are, in fact, not eligible for coverage. Some portion may have been modified and resubmitted and are actually present on the bill files. HCFA does not have an estimate of the number of bills which were originally returned and then resubmitted and either paid or denied again. Finally, some of the rejected claims may indeed be valid claims which have not been resubmitted and are therefore, still outstanding. While it

18. Lisa Dubay, Urban Institute Working Paper 3586-03, pp. 5, 11.

is possible that there are more outstanding bills in 1985 because that file is more recent and therefore more likely to exhibit billing lags, it is also likely that a higher percentage of claims were rejected by HCFA in 1985 given the reports of increased claim denials. The available data do not support an analysis of the outstanding bills from either the 1983 or the 1985 file. It is therefore, not possible to estimate the extent to which either file contains fewer stays or covered days than were actually provided because of billing lags. However, based upon the available evidence, it is possible that billing lags are a potentially minor factor in explaining the decline in SNF admissions during the 1983-1985 time period.

Changes in the Relative Importance of DRGs

Given the observed decline in the number of SNF covered days the most relevant question for purposes of this analysis, is how has the distribution of days changed in the pre- and post-PPS time period with regard to diagnosis? Some shifting in the relative importance of individual DRGs over time is evident in Table 3. The most notable shifts can be found among DRGs 89, 256, 294, 429, and 466. These shifts reflect an increase in the number and proportion of days attributable to care for simple pneumonia and pleurisy (DRG 89), and aftercare without history of malignancy (DRG 466), and a decline in the number and proportion of days attributable to the treatment of other muscoloskeletal system and corrective tissue diagnoses (DRG 256), diabetes (DRG 294), and organic disturbances and mental retardation (DRG 429). These findings are consistent with the survey results reported by Feder, Scanlon, and Hoffman. They reported that declines in the award of any coverage were most likely when the services required involved the supervision of unskilled services,

Table 3

Covered Days and Relative Weights for the Most Frequently Represented SNF DRGs

DRG Code	1983 Rank	1985 Rank	Description	Covered Days, 1983	Covered Days, 1985	Weights per Covered Day
12	9	5	Degenerative Nervous System Disorders	140,419	174,286	1.1244
14	1	1	Specific Cerebrovascular Disorders Except TIA	1,019,343	880,630	1.0671
82	19	18	Respiratory Neoplasms	57,256	45,345	1.0350
88	10	12	Chronic Obstructive Pulmonary Disease	96,119	63,771	1.0108
89	11	6	Simple Pneumonia & Pleurisy Age > 17 w/cc	93,033	116,591	0.9134
127	4	7	Heart Failure & Shock	228,484	107,435	0.8911
130	15	14	Peripheral Vascular Disorders with cc	97,522	75,299	0.9933
132	6	9	Atherosclerosis with cc	174,359	97,911	0.8768
172	16	15	Digestive Malignancy w/cc	74,374	57,659	0.9293
235	13	20	Fractures of Femur	117,775	72,578	1.0232
236	2	3	Fractures of Hip & Pelvis	906,686	645,292	1.0474
243	20	21	Medical Back Problems	63,884	43,440	1.1293
244	23	24	Bone Diseases & Specific Arthopathies w/cc	47,399	34,044	1.2641
249	17	10	Aftercare, Musculoskeletal System & Connective Tissue	83,313	91,230	1.1259
253	21	22	Fx, Sprn, Strn, & Disl. of Up arm w/cc low leg, ex. foot age > 17 w/cc	82,426	52,450	1.0243
256	8	19	Other Muscoloskeletal System & Corrective Tissue Diagnosis	135,767	65,275	1.0429
271	12	8	Skin Ulcers	153,736	170,477	1.0761
294	7	17	Diabetes age > 35	136,452	69,651	0.9167
296	22	13	Nutritional & Misc. Metabolic Disorders Age > 17 w/cc	67,005	82,769	0.8932
320	14	11	Kidney & Urinary Tract Infections age > 17 w/cc	81,157	81,232	0.8151
429	18	23	Organic Disturbances & Mental Retardation	88,718	57,735	0.7847
466	24	16	Aftercare without History of Malignancy as Secondary Diagnosis	11,610	43,519	1.3761
467	5	4	Other Factors Influencing Health Status	256,259	154,972	0.9311
470	3	2	Ungroupable	749,756	835,116	0.9465

observation of unstable patients, and care for the terminally ill.[19] Despite the shifts noted above, the two most important diagnosis related groups: specific cerebrovascular disorders except TIAs (DRG 14), and fractures of hip and pelvis (DRG 236)—retain their relative importance, accounting for 45.7 percent of all groupable days in 1983 and 46.5 percent in 1985.

The other significant item evident from Table 3 is the relative importance of DRG 470, which is an "ungroupable" category. The ungroupable category is, as the name connotes, a conglomeration of all the diagnosis codes which did not fit into any other category. In part these are codes which simply don't apply to any specific DRG code, but they also include miscodes (e.g., apostrophes, commas and other random marks which would confound the DRG grouper program) and diagnosis codes written in words rather than ICD-9 (International Classification of Disease, edition 9) code. However, only bills with nonzero covered charges were included in the analysis, so that the bills in DRG category 470 were paid by Medicare, miscodes and all. Because of the relative size and amorphous nature of this ungroupable category, a separate analysis was conducted to determine whether the composition, i.e. mix, of diagnosis codes in category 470 changed over time. The results of that analysis indicate that there was no significant change in the make-up of DRG code 470, with regard to total covered charges.

Table 3 also presents weights per day by DRG, for total covered charges. The covered charge per day weights range from a low of .7847 for organic disturbances and mental retardation, to 1.3761 for aftercare without history of malignancy. It is interesting to note that the DRG category with the lowest weight is one which declined in absolute and relative importance between 1983

19. Feder, Scanlon, and Hoffman, p. 3.

and 1985, while the converse is true of the DRG with the highest weight. DRG 467, aftercare without history of malignancy, includes the diagnoses post-surgical and orthodontics aftercare, surgery and fracture follow-up, and other unspecified aftercare. Given declining lengths of hospital stays, an increase in the number of SNF days attributable to post-surgical or fracture aftercare is to be expected. The observed decline in the relative importance of DRG 429, organic disturbances and mental retardation, may be reflective of the higher claims denial rate in 1985. It is possible that coverage for organic disturbances and mental retardation was more difficult to obtain in 1985 since such diagnoses are more likely to be judged suitable for treatment at the intermediate are level.

The Casemix Indices

As described earlier, the final step in constructing the casemix indices is to multiply the weight for each specific DRG by the proportion of total covered days a given facility provided in that DRG category, and then sum over all DRGs to obtain a casemix index for all matched facilities. Table 4 presents mean casemix indices for 1983 and 1985 for total covered charges per day. The indices and the corresponding T statistics for the mean difference between the 1983 and 1985 indices are presented by state. The most striking observation with regard to the state indices, is the extreme variation in both the direction and degree of change across states. This serves to confirm the points made earlier with regard to the differences in the supply of Medicare beds by state, the influence of individual state Medicaid programs upon the supply of Medicare SNF beds and days of care, and differences in the interpretation of Medicare coverage rules by individual intermediaries.

Table 4

Mean Covered Charge per Day Casemix Index by State, 1983 and 1985 and Difference in Casemix Index

	N	Covered Charge/Day Index Mean 1983	Mean 1985	T Statistic
Total U.S.	3148	0.9979	1.0083	10.88**
Total U.S. Except Waiver States	2579	0.9993	1.0134	12.96**
Total Waiver States	569	0.9912	0.9851	-2.38**
Alabama	75	0.9757	0.9841	1.83*
Alaska	1	0.9827	1.0713	—
Arizona	12	1.0213	1.0632	5.17**
Arkansas	3	0.9877	1.0449	1.69
California	542	1.0033	1.0102	3.65**
Colorado	18	1.0146	1.0393	3.06**
Connecticut	76	0.9971	0.9908	-1.31
Delaware	8	1.0059	1.0165	0.88
District of Columbia	2	1.0156	1.0452	1.47
Florida	137	1.0052	1.0284	7.38**
Georgia	41	1.0046	1.0187	1.61
Hawaii	16	1.0381	1.0901	1.30
Idaho	19	0.9956	1.0185	2.49**
Illinois	134	0.9793	1.0055	6.37**
Indiana	53	1.0016	1.0021	0.09
Iowa	18	1.0082	1.0405	1.84*
Kansas	20	1.0109	1.0554	2.36**
Kentucky	49	1.0142	0.9962	-2.89**
Louisiana	7	0.9972	1.0029	0.64
Maine	9	1.0337	1.0333	-0.02
Maryland[1]	51	1.0089	1.0115	0.32
Massachusetts[1]	57	1.0163	1.0180	0.12
Michigan	153	0.9886	1.0018	5.73**
Minnesota	58	1.0280	1.0149	-1.60*
Mississippi	0	—	—	—
Missouri	40	0.9835	1.0260	5.18**
Montana	38	0.9924	1.0226	2.24**
Nebraska	9	1.0039	0.9983	-0.61
Nevada	18	0.9792	1.0115	2.18**
New Hampshire	12	1.0417	1.0081	-3.70**
New Jersey[1]	93	1.0003	1.0017	0.38
New Mexico	4	1.0313	1.1169	1.26
New York[1]	368	0.9826	0.9721	-3.55**
North Carolina	87	0.9984	1.0289	4.81*
North Dakota	23	0.9779	0.9765	-0.11
Ohio	205	0.9983	1.0200	5.17**
Oklahoma	6	1.0211	1.1172	1.64
Oregon	40	1.0175	1.0003	-3.63**
Pennsylvania	286	0.9964	1.0045	3.35**
Rhode Island	30	1.0081	1.0086	0.07
South Carolina	53	0.9857	1.0162	3.82**
South Dakota	1	0.9469	1.0459	—
Tennessee	50	0.9755	1.0381	9.76**
Texas	28	1.0042	1.0093	0.86
Utah	17	0.9917	1.0024	1.24
Vermont	14	1.0594	1.0276	-2.16**
Virginia	46	1.0131	1.0291	2.54**
Washington	59	0.9991	1.0324	5.44**
West Virginia	22	0.9997	1.0148	1.89*
Wisconsin	34	1.0104	1.0181	1.48
Wyoming	0	—	—	—

1. PPS waiver states.

* Average change between 1983 and 1985 significantly different from zero at the 90% level of confidence

** Average change between 1983 and 1985 significantly different from zero at the 95% level of confidence

As shown in Table 4, in 1983 the average casemix index ranged from .94 in South Dakota to 1.04 in New Hampshire. In 1985, the index ranged from .97 in North Dakota and New York to 1.07 in Hawaii. Ten states showed declines in their casemix indices, 37 states showed an increase. New York, the largest of the four waiver states in terms of the number of beds and participating facilities, had a significant decline. Overall, PPS states had a significant increase in casemix measured by covered charges per day, from .9993 in 1983 to 1.0134. The waiver states showed a significant decline from .9912 in 1983 to .9672 in 1985.

Table 5 summarizes the change in the index described above for the total U.S., PPS states combined, and the combined and individual waiver states. As shown in that table, significant increases in the casemix index were observed for skilled nursing facilities located in PPS states. Facilities located in a waiver state showed significant declines in the total covered charge per day index. Maryland, Massachusetts and New Jersey experienced nonsignificant growth in their casemix indices, while New York facilities exhibited a significant decline.

IV. REGRESSION ANALYSIS

The observed variation in casemix changes by state serves to underscore the hypothesized impact of variations in bed supply and Medicaid reimbursement systems on Medicare beneficiaries' access to SNF care. Regression equations were estimated in order to identify the relative importance of the factors contributing to the observed changes in the casemix indices. The variables included in the regressions are described in Table 6. Means and standard deviations for those variables are presented in Table 7. The dependent

Table 5

Summary Table of Casemix Indices 1983 and 1985,
PPS States, and Waiver States

	N	83 Mean	85 Mean	T
Total U.S.	3148	0.9979	1.0083	10.88**
PPS States	2579	0.9993	1.0134	13.96**
Waiver States	569	0.9912	0.9851	-2.38**
Waiver States:				
Maryland	51	1.0089	1.0115	0.32
Massachusetts	57	1.0163	1.0180	0.12
New Jersey	93	1.0003	1.0017	1.26
New York	368	0.9826	0.9721	-3.55**

* Average change between 1983 and 1985 significantly different from zero at the 90% level of confidence.

** Average change between 1983 and 1985 significantly different from zero at the 95% level of confidence.

Table 6

Regression Variables and Definitions

Independent Variables

CERT65Z83	Certified beds per population age 65+ in the market area, 1983.
PCARETOT	Medicare beds as percent of total certified beds in the market area, 1985.
PSNFTOT	Percent of total certified beds certified as SNFs in the market area, 1985.
DEFRA1	Average state facility ratio (cost to Medicare ceiling) less than 0.9 1=Yes 0=No
DEFRA3	Average state facility ratio (cost to Medicare ceiling) greater than 1.05 1=Yes 0=No
WMINC75	Weighted median income population age 75+ in the market area, 1985.
WPPOP75	Weighted percent population age 75+ in the market area, 1985.
WAIVER	Waiver state 1=Yes 0=No
PROS	Prospective individual facility rate for Medicaid in 1983 1=Yes 0=No
CASEMIX	Medicaid casemix adjustment in 1983 1=Yes 0=No
CHNG	1983-85 change from retrospective to prospective system 1=Yes 0=No
FLAT	Medicaid reimbursed under a flat rate system in 1983 1=Yes 0=No
HOSPBASE	SNF was hospital based in 1983 1=Yes 0=No
CHAIN	SNF was a member of a chain organization in 1983 1=Yes 0=No
NONPROF3	SNF was nonprofit in 1983 1=Yes 0=No
GOVT3	Government owned facility in 1983 1=Yes 0=No
ADMBED83	Facility level Medicare admissions per certified bed in 1983
PCHGDISH	Percent change in Meedicare hospital discharges in the market area, 1983-1985
PCHGLOS	Percent change in Medicare hospital length of stay in the market area, 1983-1985.
WCOV83PD	Facility casemix index in 1983

Dependent Variables

DIFCOVPD	Difference in covered charge per day casemix indices between 1983 and 1985
PDFCOVPD	Percentage change in covered charge per day casemix indices between 1983 and 1985

Table 7

Independent Variables Means and Standard Deviations

Independent Variable	Mean	Standard Deviation
CER65Z83	50.3150	17.6399
PCARETOT	0.5085	0.2561
CASEMIX	0.1672	0.3732
DEFRA1	0.2794	0.4487
DEFRA3	0.2235	0.4167
WMINC75	11906.2405	2257.9435
WPPOP75	5.04532	1.3017
WAIVER	0.1822	0.3860
PROS	0.5660	0.4957
CHRP	0.0067	0.0814
FLAT	0.1895	0.3920
HOSPBASE	0.1257	0.3315
CHAIN	0.0389	0.4877
NONPROF3	0.6634	0.4726
GOVT3	0.0901	0.2864
ADMBED83	1.0343	1.6563
PCHGDISH	-0.0402	0.1368
WCOV83PD	0.9979	0.0351
PCHGLOS	-0.1211	0.0805
PSNFTOT	0.6762	0.2615

variables were the mean and mean percentage change in the facility's covered charge per day index. The independent variables included characteristics of the bed supply in the nursing home's market area (CER65Z83, PCARETOT, and PSNFTOT); characteristics of the population that the nursing home could potentially serve, (WPPOP75 and WMINC75); financial characteristics of facilities in the state in which the individual facility is located (DEFRA1 and DEFRA3); characteristics of the Medicaid program for the state in which the facility is located (CASEMIX, PROS, FLAT, and CHRP); whether or not the facility is located in a PPS or Waiver state (WAIVER); facility level characteristics (HOSPBASE, CHAIN, NONPROF3, GOVT3); measures of the facility's base year casemix index (WCOV83PD); and the 1983-1985 change in hospital discharges and length of stay in the SNF's market area (PCHGDISH, and PCHGLOS). The two models, mean change in casemix (DIFCOVPD) and mean percentage change in casemix (PDFCOVPD) produced very similar results. The discussion will therefore be confined to the percentage change regressions.

Construction of Market Level Variables

As noted above, several of the variables used in the regression equations are based on market level data. This permits an analysis of the impact of market characteristics on individual facility behavior. Market areas were constructed at the three digit zip code level for rural areas and at an approximation of the Metropolitan Statistical Area (MSA), based on three digit zip codes, for urban areas. The nursing home market level variables (CER65Z83, PCARETOT, and PSNFTOT) were constructed using data from the Medicare/Medicaid Certification System (MMACS) file, and are based on all certified SNFs. Thus while the regression equations include individual facility observations for approximately 3,000 nursing homes, the market level variables have aggregated

information on approximately 17,000 nursing homes located in roughly 545 separate market areas. The market level population variables (WMINC75 and WPPOP75) were constructed from the 1980 Decennial Census of Population trended to 1985. The market level hospital variables, (PCHGDISH and PCHGLOS) were constructed from zip code level data derived from the 1983 and 1985 American Hospital Association Annual Surveys of Hospitals. The data pertain to changes in discharges and length of stay for Medicare beneficiaries in short term general medical and surgical, community hospitals. Records from the Census and AHA files were also aggregated to the same 545 separate market areas.

While the aggregation based on three digit zip code is not a perfect measure of nursing home market areas, it is nevertheless a good proxy variable since three digit zip codes and MSAs are based on existing transportation hubs and existing natural lines of transportation. They therefore are reflective of local economic patterns.[20] The Health Services Area (HSA), which is designed to represent health care delivery markets, may be a more appropriate measure of nursing home markets, however, HSA level nursing home bed supply and population data are not available.

Hypotheses

Most of the variables included in the regression equations can be roughly categorized as measuring the supply of Medicare SNF care, and the demand for Medicare covered SNF care. There are both facility level and market level variables in each category.

The relative supply of beds in the market area in which the facility is located, is measured by CER65Z83, PCARETOT, and PSNFTOT. The CER65Z83 and

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20. Rand McNally, Rand McNally Zip Code Atlas, Chicago, Illinois, p. 5, as cited in Dubay, Urban Institute Working Paper 3586-03, p. 15.

PSNFTOT variables are more easily interpreted variables than the PCARETOT variable. CER65Z83 is the measure of certified beds (i.e., Medicare or Medicaid certified) in the facility's market area in 1983. We might expect a negative relationship between this variable and change in casemix for two reasons. First, in a relatively high bed supply area, any change in Medicare casemix will be spread out over more beds, so that the impact of a change on any one facility's casemix index can be relatively small. Second, a high number of certified beds in the area may be indicative of a high level of Medicaid certification and participation rather than Medicare, so that the response to changes in the Medicare population by facilities in high certified bed areas may be small.

The PSNFTOT variable is perhaps a more direct measure of the bed supply in the market area relevant to the Medicare SNF population. We would anticipate a positive relationship between this variable and the percentage change in Medicare SNF casemix. Facilities located in areas with a high proportion of their total certified beds certified at the SNF level are more likely to be staffed at higher levels and more likely to provide care to Medicare SNF patients.

The PCARETOT variable which measures the percentage of total beds certified by Medicare, is more difficult to predict. If a high percentage of certified beds are Medicare certified, it may be an indication that access is not a problem in that area because facilities are providing Medicare SNF beds. However, the converse may also be true. As a result of severe access problems, sixteen states have mandated that all SNF beds must be certified by Medicare. Thus, on the one hand, a high proportion of Medicare to total certified beds may be indicative of good access to care, and a willingness to treat Medicare SNF patients, on the other hand, it may also indicate exactly the reverse case.

As a result of the confounding influence of mandated certification on the PCARETOT variable, PSNFTOT may instead be a better measure of a facility's willingness and ability to participate in the Medicare program and treat a sicker mix of patients. The higher the proportion of SNF beds in the market area, the greater is the probability that any one facility will treat Medicare patients, and be able to provide the services required of a more resource intensive patient mix. It is also possible that the greater the proportion of SNF beds in the area, the greater the market competition, and therefore any one facility will be less able to selectively admit Medicare patients according to their resource needs (i.e. creamskim).

At the facility level, the relative willingness of a facility to participate in the Medicare SNF program is measured in the base year by ADMBED83, the number of Medicare admissions per certified bed. The higher the admissions per bed ratio, the greater the participation in the Medicare SNF program. We would expect these high volume homes to be more likely to increase their Medicare casemix to meet changes in demand, simply because these homes are more responsive to the Medicare program. The lower the base year participation (i.e., low admissions per bed ratio) the less likely a facility would be to increase the resource intensity of their patient mix. We would therefore anticipate a positive sign on the ADMBED83 variable.

The willingness of a given facility to treat a more resource intensive patient mix is measured in the base year by including the facility's 1983 casemix index. We might expect that the higher the base year casemix level, the less likely the facility is to increase casemix any further. In other words, those facilities which are already treating a highly resource intensive mix of patients may have less room to increase casemix any further, and any change from a relatively high base will appear very small. Those facilities

with an initially low casemix index may exhibit a great increase by taking on either a limited number of much more resource intensive patients, or a larger number of marginally more resource intensive patients. We would therefore expect to find a negative relationship between the initial casemix index and the change in the indices.

Medicare reimbursement incentives are measured at the market level by the DEFRA1 and DEFRA3 variables. DEFRA1 equals 1 when the average cost to ceiling ratio for all Medicare facilities in the state is less than 90 percent of the Medicare cost ceiling. DEFRA3 is equal to 1 when average costs in the state are greater than 105 percent of the Medicare ceiling. We would expect both of these variables to have a negative sign. If the facility is located in a relatively low cost state (DEFRA1=1) then, as discussed in an previous section, the facility is probably responding to a tightly cost constrained Medicaid market. Such facilities will be less able to treat higher cost Medicare patients. If the facility is located in a relatively higher cost state where, on average, facility costs are above the ceiling, then the facility will not be reimbursed its full cost of treating a Medicare patient. Such facilities may be even less likely to increase their patient casemix.

Variables which measure the potential demand for care in the area include WMINC75, WPPOP75, PCHGDISH, and PCHGLOS. The first two variables provide some indication of the characteristics of the population demanding care in the market area. WMINC75 is a measure of the mean income of the population 75 or older in the market area. We might anticipate that the higher the income of the population over age 75 in the area, the less the pressure on demand for Medicare SNF care, because higher incomes imply greater ability to enter nursing homes as a private pay patient. Also, if income is actually a proxy measure for health status, the lower the income, the greater the expected

demand for care by a sicker mix of patients. We would therefore expect a negative sign for the WMINC75 variable.

The WPPOP75 variable is a measure of the proportion of the population in the market area that is age 75 or older. This is the population which is most likely to demand SNF care. The greater the proportion of 75+ elderly in the population, the higher the expected demand for SNF care, and the higher the expected casemix among facilities located in those areas. We would therefore anticipate a positive relationship between WPPOP75 and the dependent variables.

PCHGDISH and PCHGLOS are two measures of hospital behavior in the market area which might influence the demand for SNF care. PCHGDISH is the percentage change in Medicare hospital discharges in the market area between 1983 and 1985. We would expect that the greater the decline in Medicare discharges, the sicker the hospital casemix (i.e., since only the sicker patients are admitted to the hospital), and thus the greater the increase in the SNF casemix. Essentially, as hospital discharges go down, SNF casemix should go up. We would therefore expect a negative sign for the PCHGDISCH variable. The same is true for PCHGLOS, the average percentage change in Medicare patients' hospital length of stay in the facility's market area. The greater the decline in hospital length of stay, the greater the expected increase in the facility's Medicare casemix index.

The WAIVER variable measures the impact of PPS on the change in SNF casemix after we have controlled for the PPS effects of changes in hospital discharge rates and hospital length of stay. Based upon the results of our descriptive analysis, we would expect a negative sign for the WAIVER (WAIVER = 1 if the facility is located in a waiver state.) variable. That is, waiver states would demonstrate a smaller increase, or an actual decrease in SNF casemix, while facilities located in PPS states would experience an increase in SNF casemix.

PROS and FLAT are measures of the characteristics of the Medicaid program in the state in which the facility is located. PROS=1 means that the facility is located in a state where facilities are subject to a prospective payment system. FLAT=1 means the facility is located in a state which reimburses for Medicaid care under a flat rate, which is generally based on rates for broad categories of homes. The omitted variable is RETRO, or retrospective, which is the least restrictive payment system. While prospective and flat rate systems are generally regarded as more restrictive than retrospective systems, the degree to which they exercise a cost constraining influence can vary considerably. Prospective payment systems can be very cost constraining if the payment rates are set low and the base from which the rates are calculated and trended forward is not updated frequently. If however, the payment base is updated frequently, prospective systems become less cost constraining. Similarly, flat rate systems may be highly cost constraining if the flat rates are set low relative to the average costs in the state. However, if for a given category of homes, the flat rates are set high relative to costs, then facilities may actually reap windfall profits by admitting Medicaid patients. Thus, it is difficult to anticipate fully the direction of these variables in the regression models. However, it is most likely that prospective and flat rate systems would tend to discourage access for more resource intensive patients. We would therefore be most likely to see negative signs on these variables. In keeping with this, we would also expect to see a negative relationship between CHGRP and the dependent variables. CHGRP is a dummy variable which is 1 if the Medicaid system in the state changed between 1983 and 1985 from a retrospective system to a prospective system. Three states experienced such a change during that time period: Alaska, Hawaii, and New Mexico.

The Medicaid reimbursement feature which is most likely to promote access of sicker Medicare patients, is a casemix based reimbursement system. Under such systems (measured by CASEMIX=1) facilities are paid more for more resource intensive patients. They therefore have a financial incentive to treat a sicker mix of Medicaid patients, and as a result are more likely to be able, both financially and in terms of staffing, etc. to treat a sicker mix of Medicare patients. We would therefore expect this variable to be significant and positive.

The remaining independent variables are measures of facility specific characteristics: HOSPBASE (1 if facility is hospital-based), CHAIN (1 if facility is a member of a chain organization), NONPROF3 (1 if the facility is nonprofit), and GOVT3 (1 if the facility is government owned). We would expect the HOSPBASE variable to be the most significant of this set of facility characteristics, for several reasons. First, hospital based facilities are subject to greater financial incentives to treat Medicare patients because it lessens the likelihood of revenue loss on the inpatient DRG side, and provides revenues under the Medicare SNF benefit. During the period of analysis, hospital based facilities were subject to higher cost ceilings than free-standing facilities. Part of the higher reimbursement structure for those facilities was reflective of higher costs due to, on average, a sicker patient mix, and higher staffing levels.[21] Given that the hospital based facility has a greater financial incentive than the freestanding facility to admit Medicare patients, and on average, it is set up for and accustomed to, providing care

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21. Sulvetta and Holahan have demonstrated, however, that less than half of the difference between freestanding facility costs and hospital based facility costs can be explained by casemix and staffing differences. See: Sulvetta and Holahan, "Cost and Casemix Differences Between Hospital-Based and Freestanding Nursing Homes," Health Care Financing Review, Spring 1986, Vol. 7, no. 3, pp. 75-84.

for a sicker mix of patients, then we would expect to see positive and significant changes in hospital based facilities' Medicare casemix.

Nonprofit SNFs and government SNFs have higher costs, on average, than the omitted variable, proprietary facility. In 1983, proprietary facilities had average routine operating costs of $43.46 per patient, per day, compared to $62.80 for nonprofits and $65.94 for government owned facilities.[22] In addition, the government owned facilities are more likely to respond to Medicaid patient's needs. Given their cost structure, it is less likely that nonprofit and government facilities would be willing to treat a more resource intensive mix of Medicare patients. Chain facilities may be more able to absorb an increase in patient casemix because of economies of scale and their relatively lower cost structure. It is also possible that chain homes may have arrangements with their member chain hospitals (e.g., National Medical Enterprise nursing homes located near National Medical Enterprise hospitals) which would cause them to behave in a manner similar to hospital based SNFs. Existing data do not permit a test of this hypothesis. However, if such behavior patterns do exist, we would anticipate a positive sign for the chain variable.

Findings

Table 8 presents the results of the regression analysis. As shown in that table, the most significant factors explaining changes in Medicare SNF casemix during the 1983-1985 time period are: location in a waiver state, area bed supply, location in a high cost state, location in a state with a Medicaid prospective or casemix reimbursement system; hospital ownership; and initial

22. HCFA Report to Congress, 1985, p. 51. Estimates derived from the Urban Institute cost study.

Table 8

Regression Results

Dependent Variable: PDFCOVPD

Independent Variable	Parameter Estimate	Standard Error
Intercept	0.7765	0.0260
CER65Z83	-0.0002	0.00005***
PCARETOT	-0.0301	0.0054***
CASEMIX	0.0056	0.0027**
DEFRA1	-0.0022	0.0026
DEFRA3	-0.0065	0.0034*
WMINC75	-2.6118E-8	4.4931E-7
WPPOP75	0.0003	0.0007
WAIVER	-0.0170	0.0035***
PROS	-0.0061	0.0024**
CHRP	[illegible]0727	0.0112***
FLAT	-0.0049	0.0037
HOSPBASE	0.0167	0.0031***
CHAIN	0.0026	0.0019
NONPROF3	-0.0031	0.0022
GOVT3	-0.0028	0.0034
ADMBED83	0.0030	0.0005***
PCHGDISH	0.0023	0.0065
WCOV83PD	-0.7469	0.0248***
PCHGLOS	0.0072	0.0135
PSNFTOT	0.0145	0.0052***

***Indicates significance at the .99 confidence level
** Indicates significance at the .95 confidence level
* Indicates significance at the .90 confidence level

levels of Medicare participation and casemix. These factors are measured by: WAIVER; CER65Z83, PCARETOT, PSNFTOT; DEFRA3; PROS, CASEMIX; HOSPBASE; ADMBED83, and WCOV83PD, respectively. Each of these variables display the expected direction as discussed in the previous section. The most significant variables are the market area bed supply measures, all three of which are significant at the 99% level of confidence, the waiver state variable, hospital ownership, and the facility's base year level of Medicare participation and casemix.

The number of certified beds per elderly in the market area, and the percent of total beds certified for Medicare are found to be negatively related to changes in the SNF casemix. A one percent decrease in the percent of beds certified for Medicare in the market area, results in a .03 percent increase in the facility level casemix index. The percent of beds certified at the SNF level is positively associated with changes in the casemix. A one percent increase in the percent of SNF certified beds is associated with a .01 percent increase in Medicare SNF casemix.

Among the facility level variables, it can be seen from Table 7 that a one percent increase in the facility's base year admissions per bed results in a 0.003 percent increase in casemix. However, a one percent increase in base year casemix results in a .75 percent decrease.

The factors which do not display any significance in explaining changes in Medicare SNF casemix are perhaps of equal interest. It is clear from the regression model that supply factors are much more dominant in explaining facility level changes in casemix than are demand factors. Neither the percent of the population over age 75 in the market area, nor the mean income of the population over age 75 is significant.

More surprising, however, is the fact that the change in hospital discharges and length of stay are not significant, and exhibit the opposite

sign of what was expected. Dubay has shown that changes in hospital discharges and length of stay do affect the change in the number of patients being admitted to SNFs,[23] however, they clearly do not have any significant effect on the type of patient being admitted to SNFs. It is possible that changes in discharges and length of hospital stay are not important explanatory factors with regard to SNF casemix because a prior hospital stay has always been a requirement for Medicare SNF coverage, and the type of patient treated under a Medicare SNF is likely to enter a hospital with a diagnosis which is not easily transferrable to an outpatient setting (e.g., stroke or hip fracture). Therefore, if hospitals are admitting fewer patients, the potential SNF users are more than likely among the patients entering hospitals at a constant rate over the 1983-1985 time period. Thus, the fact that hospitals are admitting fewer patients may be irrelevant with regard to SNF casemix, because those patients who are now being treated on an outpatient basis rather than an inpatient basis are not likely users of SNF care.

It is also possible that the change in average length of stay variable suffers from a similar measurement problem. Average hospital length of stay will decline for two reasons. Declines may occur because of the changes in the mix of patients admitted to hospitals, and because of changes in the length of stay which would occur even if casemix had remained constant. For example, if prior to PPS patient A was discharged from the hospital with a length of stay of 6 days, and patient B was discharged with a length of stay of 4 days, the average length of stay was 5 days. If, in 1985, patients like patient B are no longer admitted to the hospital, but are instead treated on an outpatient basis, and the length of stay for patients like patient A is reduced to 4 days,

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23. Dubay, Urban Institute Working Paper 3586-03.

the average length of stay has been reduced by 20 percent. However, most of that change in average length of stay is attributable to changes in hospital casemix. The change in average length of stay measure used in our equations, is not casemix adjusted. As noted earlier, Farley has shown a dramatic difference between the change in average length of stay and casemix adjusted change in length of stay. While one could argue that the inclusion of the change in discharge variable in the equation is an attempt to control for the effect of changes in hospital casemix, we have noted that this variable may not be measuring the changes in the population of potential SNF users. Since the change in length of stay variable is an average across all hospital patients, it is quite possible that that variable is also a poor measure of the impact of the change in length of stay for potential SNF users. It thus appears that the WAIVER variable may more accurately measure the changes in hospital behavior which affect the population of potential SNF users. The waiver variable appears to capture changes above and beyond that which can be measured by changes in average length of stay and discharges, and it clearly indicates that there is greater pressure on SNF casemix in PPS states than in waiver states.

V. CONCLUSIONS

The main conclusion which can be drawn from this analysis is that there was some slight increase in the casemix treated in Medicare SNFs between the 1983 pre-PPS period and the 1985 post-PPS period. It is also evident that these casemix changes were more likely to occur in PPS-covered states than in waiver states. They were also more likely to occur in hospital-based facilities, and facilities with a relatively higher level of Medicare participation. Location in a state where the Medicaid program has a casemix reimbursement system was also a positive factor in increased Medicare casemix.

It is evident from this analysis which factors explain changes in SNF casemix. What we can conclude with regard to access to SNF care for Medicare beneficiaries is somewhat less evident. Perhaps the strongest conclusions which can be drawn are these: PPS is more than likely resulting in the discharge of a patient mix which requires greater SNF resources. This has been reflected in a somewhat higher casemix for SNFs located in PPS states. However, while the relatively small degree of this increase may provide evidence that the practice of cream skimming has not occurred on a gross scale, we cannot conclude that cream skimming has been totally absent. It is still possible that the increase in SNF casemix observed has not been commensurate with the increase in resource intensity required by the population demanding SNF care. A conclusive test of this hypothesis would require additional information on the characteristics of the patients discharged from hospitals who demanded but did not receive SNF care and measures of the severity of illness among hospital discharges and nursing home admissions.

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